

AMENDMENTS TO THE CLAIMS

Please add or amend the claims to read as follows, and cancel without prejudice or disclaimer to resubmission in a divisional or continuation application claims indicated as cancelled:

1. (Original) A method for determining image block significance based on region contrast, the method comprising:

- a) partitioning an image frame into multiple pixel regions of at least one pixel each;
- b) pairing any of said regions with an unpaired, adjoining region;
- c) calculating a similarity value between each region in any of said region pairs;
- d) merging paired regions of any of said pairs into a single region, where said region pair to be merged has a predefined similarity value, thereby creating a new partition of said image frame into multiple pixel regions;
- e) performing steps a) – d) a plurality of times, thereby obtaining a sequence of image partitions;
- f) selecting within said image frame an image sub-area of a predefined size and shape;
- g) identifying a partition in said sequence of partitions in which said image sub-area is covered by any of said regions to the extent of a predefined coverage measure; and
- h) calculating a region contrast significance value $C(B)$ of said image sub-area as a value which is proportional to the position of said identified partition in said sequence of partitions.

2. (Original) A method according to claim 1 wherein said calculating step c) comprises calculating the contrast between any of said pairs.

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3. (Original) A method according to claim 1 wherein said calculating step c) comprises:

calculating the average luminescence of the pixels in one region in any of said pairs; and

subtracting said average luminescence from the average luminescence of the pixels in the other region in said pair.

4. (Original) A method according to claim 1 wherein said merging step d) comprises merging where said region pair to be merged has a predefined similarity value representing the least absolute contrast of any of said pairs.

5. (Original) A method according to claim 1 wherein said performing step e) comprises performing until a predefined number of regions is achieved.

6. (Original) A method according to claim 1 wherein said performing step e) comprises performing until said similarity value reaches a predefined threshold value.

7. (Original) A method according to claim 1 wherein said performing step e) comprises performing until a predefined stop condition is met.

8. (Original) A method according to claim 1 wherein said selecting step f) comprises selecting an 8x8 pixel block.

9. (Original) A method according to claim 1 wherein said identifying step g) comprises identifying the first partition in said sequence of partitions in which said image sub-area is covered by any of said regions to the extent of said predefined coverage measure.

10. (Original) A method according to claim 1 wherein said identifying step g) comprises identifying said partition in said sequence of partitions in which said image sub-area is completely covered by any of said regions.

11. (Original) A method according to claim 1 wherein said identifying step g) comprises identifying the first partition in said sequence of partitions in which said image sub-area is completely covered by any of said regions.

12. (Original) A method according to claim 1 where any of said steps are performed on either of a JPEG image and an MPEG video frame.

13. (Original) A method for encoding image sub-areas, the method comprising:

a) partitioning an image frame into multiple pixel regions of at least one pixel each;

b) pairing any of said regions with an unpaired, adjoining region;

c) calculating a similarity value between each region in any of said region pairs;

d) merging paired regions of any of said pairs into a single region, where said region pair to be merged has a predefined similarity value, thereby creating a new partition of said image frame into multiple pixel regions;

e) performing steps a) – d) a plurality of times, thereby obtaining a sequence of image partitions;

f) selecting within said image frame an image sub-area of a predefined size and shape;

g) identifying a partition in said sequence of partitions in which said image sub-area is covered by any of said regions to the extent of a predefined coverage measure;

h) calculating a region contrast significance value of said image sub-area as a value which is proportional to the position of said identified partition in said sequence of partitions; and

i) designating said image sub-area for enhanced encoding by a video encoder where said significance value meets a predefined criterion.

14. (Original) A method according to claim 13 where any of said steps are performed on either of a JPEG image and an MPEG video frame.

15. (Original) A method according to claim 13 wherein said designating step comprises designating where said significance value is at or above a predetermined threshold.

16. (Original) A method according to claim 13 wherein said designating step comprises quantizing DCT coefficients of said image sub-area using lower quantizer values than for another image sub-area whose significance value is below said predetermined threshold.

17. (Original) A method according to claim 13 wherein said designating step comprises:

scanning DCT coefficients of said image sub-area in accordance with a predefined scanning pattern; and

halting said scanning when $L(B)$ of said DCT coefficients have been scanned, where

$$L(B) = \left\{ \begin{array}{ll} 64 & \text{if } C(B) \geq T \\ k \times C(B) & \text{otherwise.} \end{array} \right.$$

where T is a predefined significance threshold and k is a predefined scaling factor.

18. (Original) A method according to claim 13 wherein said designating step comprises:

scanning DCT coefficients of said image sub-area in accordance with a predefined scanning pattern; and

quantizing any of said DCT coefficients located at an i -th position of said scanning pattern using a quantizer value as $P(i) * (M - k * C(B))$,

where $P(i)$ is a value of a quantization pattern for i -th position of said scanning pattern, where M is a quantization threshold, and where k is a predefined scaling factor.

19. (Original) A method according to claim 13 wherein said designating step comprises:

determining that said image sub-area is to be encoded in INTRA encoding mode where said significance value meets said predefined criterion.

20. (Original) A method according to claim 13 wherein said designating step comprises:

determining that said image sub-area is to be encoded in INTRA encoding mode if said image sub-area has a significance value at or above a predetermined threshold.

21. (Original) A method according to claim 13 wherein said designating step comprises:

determining that said image sub-area is to be encoded as the difference between said sub-area and a sub-area in another frame if said first sub-area has a significance value below said threshold.

22. (Cancelled)

23. (Original) Apparatus for encoding image sub-areas according to their significance comprising:

a video encoder; and

a computation module operative to:

a) partition an image frame into multiple pixel regions of at least one pixel each;

b) pair any of said regions with an unpaired, adjoining region;

c) calculate a similarity value between each region in any of said region pairs;

d) merge paired regions of any of said pairs into a single region, where said region pair to be merged has a predefined similarity value, thereby creating a new partition of said image frame into multiple pixel regions;

e) perform steps a) – d) a plurality of times, thereby obtaining a sequence of image partitions;

f) select within said image frame an image sub-area of a predefined size and shape;

g) identify a partition in said sequence of partitions in which said image sub-area is covered by any of said regions to the extent of a predefined coverage measure;

h) calculate a region contrast significance value of said image sub-area as a value which is proportional to the position of said identified partition in said sequence of partitions; and

i) designate said image sub-area for enhanced encoding by said video encoder where said significance value meets a predefined criterion.

24. (Original) Apparatus according to claim 23 wherein said computation module is operative to process either of a JPEG image and an MPEG video frame.

25. (Original) Apparatus according to claim 23 wherein said computation module is operative to designate said image sub-area for enhanced encoding where said significance value is at or above a predetermined threshold.

26. (Original) Apparatus according to claim 23 wherein said computation module is operative to quantize DCT coefficients of said image sub-area using lower quantizer values than for another image sub-area whose significance value is below said predetermined threshold.

27. (Original) Apparatus according to claim 23 wherein said computation module is operative to:

scan DCT coefficients of said image sub-area in accordance with a predefined scanning pattern; and

halt said scanning when $L(B)$ of said DCT coefficients have been scanned, where

$$L(B) = \begin{cases} 64 & \text{if } C(B) \geq T \\ k \times C(B) & \text{otherwise.} \end{cases}$$

where T is a predefined significance threshold and k is a predefined scaling factor.

28. (Original) Apparatus according to claim 23 wherein said computation module is operative to:

scan DCT coefficients of said image sub-area in accordance with a predefined scanning pattern; and

quantize any of said DCT coefficients located at an i -th position of said scanning pattern using a quantizer value as $P(i) * (M - k * C(B))$,

where $P(i)$ is a value of a quantization pattern for i -th position of said scanning pattern, where M is a quantization threshold, and where k is a predefined scaling factor.

29. (Original) Apparatus according to claim 23 wherein said computation module is operative to:

determine that said image sub-area is to be encoded in INTRA encoding mode where said significance value meets said predefined criterion.

30. (Original) Apparatus according to claim 23 wherein said computation module is operative to:

determine that said image sub-area is to be encoded in INTRA encoding mode if said image sub-area has a significance value at or above a predetermined threshold.

31. (Original) Apparatus according to claim 23 wherein said computation module is operative to:

determine that said image sub-area is to be encoded as the difference between said sub-area and a sub-area in another frame if said first sub-area has a significance value below said threshold.

32. (Original) A computer program embodied on a computer-readable medium, the computer program comprising:

a first code segment operative to partition an image frame into multiple pixel regions of at least one pixel each;

a second code segment operative to pair any of said regions with an unpaired, adjoining region;

a third code segment operative to calculate a similarity value between each region in any of said region pairs;

a fourth code segment operative to merge paired regions of any of said pairs into a single region, where said region pair to be merged has a predefined similarity value, thereby creating a new partition of said image frame into multiple pixel regions;

a fifth code segment operative to perform steps a) – d) a plurality of times, thereby obtaining a sequence of image partitions;

a sixth code segment operative to select within said image frame an image sub-area of a predefined size and shape;

a seventh code segment operative to identify a partition in said sequence of partitions in which said image sub-area is covered by any of said regions to the extent of a predefined coverage measure; and

a eighth code segment operative to calculate a region contrast significance value of said image sub-area as a value which is proportional to the position of said identified partition in said sequence of partitions.

~~32.~~ 33. (Currently amended) A computer program according to claim ~~31~~32 and further comprising:

a ninth code segment operative to designate said image sub-area for enhanced encoding by said video encoder where said significance value meets a predefined criterion.